

Borehole

21-12-02**Log Event A****Borehole Information**

Farm : <u>BX</u>	Tank : <u>BX-112</u>	Site Number : <u>299-E33-153</u>
N-Coord : <u>45,616</u>	W-Coord : <u>53,503</u>	TOC Elevation : <u>653.82</u>
Water Level, ft :	Date Drilled : <u>12/31/1971</u>	

Casing Record

Type : <u>Steel-welded</u>	Thickness, in. : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>100</u>	

Borehole Notes:

Borehole 21-12-02 was drilled in December 1971 to a depth of 100 ft with 6-in. casing. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. Although no information concerning grouting or perforations was available, it is assumed that the borehole was not grouted or perforated since this was not a routine practice during the early 1970s drilling campaign. The top of the casing, which is the zero reference for the SGLS, is about 0.5 ft below the ground surface.

Equipment Information

Logging System : <u>2</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>04/1997</u>	Calibration Reference : <u>GJO-HAN-13</u>	Logging Procedure : <u>P-GJPO-1783</u>

Log Run Information

Log Run Number : <u>1</u>	Log Run Date : <u>07/01/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>6.5</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

Log Run Number : <u>2</u>	Log Run Date : <u>07/02/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>99.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>11.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

Log Run Number : <u>3</u>	Log Run Date : <u>07/03/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>12.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>5.5</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

Borehole

21-12-02**Log Event A**

Log Run Number :	<u>4</u>	Log Run Date :	<u>07/03/1997</u>	Logging Engineer:	<u>Bob Spatz</u>
Start Depth, ft.:	<u>30.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>12.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Analysis Information

Analyst : E. LarsenData Processing Reference : MAC-VZCP 1.7.9Analysis Date : 12/12/1997**Analysis Notes :**

This borehole was logged by the SGLS in three log runs with an additional log run performed to repeat an interval of the borehole as a quality check. The pre-survey and post-survey field verification spectra for all logging runs met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

The man-made radionuclides Cs-137 and Co-60 were detected in this borehole. The Cs-137 contamination was detected nearly continuously from the ground surface to 24.5 ft and continuously from 41.5 to 45 ft. A small zone of Co-60 contamination was detected from 42.5 to 43.5 ft.

An analysis of the shape factors associated with applicable segments of the spectra was performed. The shape factors provide insights into the distribution of the Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides.

The K-40 concentrations increase between 40 and 42.5 ft and decrease gradually between 42.5 and 56 ft. The K-40 concentration values increase again from 56 to 60 ft and remain elevated to the bottom of the logged interval (99 ft).

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Reports for tanks BX-109 and BX-112.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the



Spectral Gamma-Ray Borehole
Log Data Report

Page 3 of 3

Borehole

21-12-02

Log Event A

SGLS data.

The interval between 12 and 30 ft was relogged as a quality assurance measure to establish the repeatability of the radionuclide concentration measurements. The plot of the radionuclide concentrations were calculated using separate data sets provided by the original and rerun logging runs.

A plot of the spectrum shape factors is included. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.